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Art. I. — *Geology and Industrial Resources of California.* By Philip T. Tyson. To which are added, The Official Reports of Generals Persifer F. Smith and B. Riley, including the Reports of Lieuts. Talbot, Ord, Derby, and Williamson, of their Explorations in California and Oregon. Baltimore. 1851. 8vo. pp. xxxiv. 127 and 37.

Among the numerous books relating to California and the region west of the Rocky Mountains, there are few, excepting the official reports of Fremont and some members of the United States Engineer corps, from which we can derive much information as to the physical geography or geology of that extraordinary country. Most of these books have been mere transcripts of the writer's personal experience, of the emigrant's perilous wanderings, or the hardships and privations of the gold-seeker, colored by the enthusiasm of success, or tinged with the sombre hues of disappointed hopes and ruined health. Many of them, among which Bayard Taylor's volumes may be especially praised, will afford the reader who may belong to the stay-at-home class of travellers much amusement; while the more adventurous, who themselves design to follow in the trail of the Californian emigrant, may glean from them valuable hints as to the preparations for their journey, and the troubles they will have to encounter before their golden dreams can be realized.

We wish now, however, to call attention to some points of scientific interest in connection with this portion of our territory, and, especially, to some general conclusions as to its resources both commercial and agricultural, and to the prospect of the further development of its mineral and metallic wealth. Our task, unfortunately, will be to show rather what ought to be done before the real extent and value of the resources of this immense territory can be fully understood, than what has been actually accomplished.

Mr. Tyson's work is perhaps the only one which has yet appeared, professing to be devoted to a scientific account of California. We ought not, however, to pass by unnoticed the official report of Mr. T. B. King, which, because it was almost the first document relating to the gold region that came before the public, and especially because it had the authority of legislative sanction, has been widely circulated. Mr. King was not a scientific observer, and his opinions upon the subject of geology are very crude and incorrect. His report was, however, in the most important respect, eminently successful. He estimated the produce of gold at what was then probably considered by most persons, at a distance from the scene of excitement, as a very exaggerated amount; while it has turned out that his estimates rather fall below, than exceed, the real yield of the washings. Thus it often happens that new discoveries are made, and new conditions arise, which have no analogy in the past, where the wisdom of the most experienced is at fault, and where the more ignorant may prove a better prophet than he who looks at what is already known as a guide to what may be expected in the future. Thus, before the copper region of Lake Superior was explored, all our knowledge of the occurrence of native copper rendered it highly probable that no deposits of this metal would be discovered in veins rich enough to be worked; yet facts have demonstrated that such veins exist near Lake Superior, although no parallel case can be found in any other part of the world. Such discoveries show, that, at least in the practical application of geological science, too much caution cannot be used in giving a positive opinion based on negative evidence.

Mr. Tyson joined the expedition that was fitted out in 1849, by General Smith, to enable Mr. King to obtain a birdseye view of the gold regions. Although not holding any official position, but rather, as we judge from his report, making a geological reconnoissance *en amateur*, Mr. Tyson communicated his observations in the form of a report to the Topographical Bureau, and with the usual fate of those who have the misfortune to fall into the hands of the printers of Congress, had to wait nearly a year before his work issued from the press. Receiving a thousand copies for his own use, he had them published at Baltimore, with an introduction containing some additional information, and, what was of equal importance, a copious list of errata, intended to make the portion of the work printed by Congress intelligible.

This expedition left the Sacramento at the junction of Feather river, and made its way in a north-east direction across the elevated and broken country to the Yuba, which river they struck some forty or fifty miles above its mouth. They then proceeded towards the south, across the immense ravines of the western flank of the Sierra Nevada, over a region elevated from 3000 to 5000 feet above the sea. They thus passed a number of the most famous localities of gold-washing, and proceeded as far south as the Calaveras, whence they turned their jaded horses' heads to the west, and made their way across the valley to San Francisco.

The great valley of California is drained by two principal streams — the one flowing north and the other south — which unite midway, and flow through a side-cut into the ocean. This immense trough has, for its eastern rim, the grand masses of the Sierra Nevada, which rise above the limits of perpetual snow. The central mass of this chain seems to be principally made up of granitic rocks, through which occasional volcanic fires have made their way, and piled up lofty peaks of débris. This granitic axis is flanked by heavy accumulations of slaty rocks, alternating with trappean and serpentine masses, and which extend as far as the valley of the Sacramento, where they are entirely concealed by sedimentary deposits of recent origin. We have no data as to the geological age of these slates, which are the gold-bearing rocks of California. That they are very ancient we have no doubt; but whether they belong to the azoic or palæozoic system, remains entirely undetermined. The similar rocks in some parts of the chain of the Andes have been found to contain fossils of the Silurian age, and it is not improbable that these talcose slates and quartz rocks belong, like the gold-bearing rocks of Vermont and Canada, to the epoch when animal life was first introduced upon the earth.

Sedimentary rocks occur at various points on the western slope of the Sierra Nevada, resting nearly horizontally on the upturned edges of the slaty rocks, thus showing that they were deposited after the latter had been elevated, broken up by igneous rocks, and changed in character. These sedimentary beds seem to be principally sandstones and conglomerates; and the same formation, apparently, extends under the Sacramento valley, and appears again in the ridges of the coast-range which forms the western rim of the great trough. Mr. Tyson refers this rock to the eocene or miocene divisions of the tertiary, though we do not find any definite authority in his work for this statement, other than the fact that "specimens of large fossil oysters were observed here, (in the sandstone at Livermore's rancho,) and Mr. Livermore informed us that he had obtained large bones, which he supposed to be those of a whale; *and he was formerly a whaler himself.*"

If it be true that these rocks are of tertiary age, and we believe the fact is corroborated by the statements of Mr. Dana and others, then the whole secondary series is wanting in California. This, of course, implies the absence of valuable beds of coal, which is a serious misfortune to a country in many portions of which wood is so scarce. Numerous discoveries of valuable beds of coal "of the best quality for steaming purposes" have been reported in the newspapers; but they have invariably turned out to be mere seams of lignite or bituminous matter in the tertiary, and of no value whatever. There seems to be no real coal formation nearer and more accessible to California than that of Vancouver's Island, where excellent bituminous coal undoubtedly occurs. This coal formation probably extends into Oregon, though we have no definite information on that head. We are informed, by Mr. Hall, that the fossils collected by Capt. Stansbury, on the Salt Lake expedition, prove the presence of the carboniferous system in that basin; we may therefore look to the discovery of coal in that region. The subject of the distribution of fossil fuel along the route to California ought to commend itself to the attention of gentlemen who are interested in the great project of a railroad between the Atlantic and Pacific; since it is evident that, unless the road can be made to cut through one or two productive coal-fields, there will be a scarcity of fuel to be apprehended along the line.

Mr. Tyson did not visit the very remarkable quicksilver deposit which occurs to the south-west of San Francisco, and which is now producing a considerable amount of that metal. We have no definite information as to the geological position of this metal, or the quantity of it which exists; but if only a small part of the reports concerning it be true, this region is capable of supplying mercury enough to work the gold of California and furnish Mexico with an abundant supply, so as to encourage the re-working of those silver mines which were abandoned on account of the monopoly of the Spanish mercury by the Rothschilds. There is no more inviting field open for speculation in California than that of quicksilver mining, and we expect soon to see the attention of our capitalists turned in that direction.

Having thus spoken of some of the mineral productions of California, we come to the gold, the great *primum mobile* in the colonization of the Pacific shores. The first discovery was made early in June, 1848, and soon drew a crowd together from San Francisco and the neighboring region. The news of the discovery did not reach the Atlantic States till late in the autumn; and it was not till the next spring that the tide of emigration began to set strongly in that direction. The overland emigration began to arrive in September. Soon the shores of the Pacific, from Oregon to Cape Horn, were lined with ships bound to the land of gold; and as the news spread across the Pacific and the Atlantic, every nation and race sent its representatives to the congress of gold-diggers. Never was a stranger mixture of races collected together. Nothing in history equals the rapidity with which this remote region was filled up by emigration, or the indomitable energy with which the perils and sufferings of the overland route were affronted. It soon became apparent that the amount of gold to be had was very great, and an extraordinary amount was, naturally enough, magnified into a marvellous one. The wise ones shook their heads, and while they acknowledged that the product might, for a short time, be very great, they prophesied that the zeal displayed by the enterprising Yankees in scratching over the ground would be so great, that the whole surface of the gold-producing region would soon be worked over, and its treasures quickly exhausted.

Mr. Tyson hardly attempts to form any estimates of the probable produce of the Californian washings; but he evidently inclined to the belief that a short time would suffice to exhaust the most accessible portion of the gold; "after which," he says, "the poorly-rewarded gold-digger will find it his interest to work at moderate wages for those who are possessed of the requisite means, skill, and knowledge to manage the business *secundum artem*, and provide comfortable homes for those whom they employ." When this change occurs, the ground, which had previously been only scratched over, will be systematically worked again, while the veins in the solid rock will be examined and their value ascertained. We do not know that any change in the mode of operations has as yet taken place, except that more skilfully-contrived machines for working the gold have been introduced, so that earth containing two cents' worth of gold to the bushel is said to be profitably washed. Temporary companies are often formed for the execution of any enterprise requiring many hands, such as the damming of streams to turn the water from the "bars," as they are called, or accumulations of sand in the river bed. Mr. Tyson thinks that nothing systematic can be accomplished till proper legislation shall enable companies to secure a sufficient quantity of land by purchase, or otherwise, to be worked efficiently and economically. We believe that no steps have yet been taken by the United States Government to lay any claim to the gold-bearing land, or to exact any rent or duty for its occupation. Every miner or company of miners takes possession of any vacant spot which can be found, and works it at his pleasure, under certain regulations established among the gold-diggers themselves, by which every person has a right to appropriate and work, so long as he pleases, a certain amount (fifteen feet square) of ground abandoned by others, or not previously occupied.

The usual rectangular system of land-surveys, according to which our public lands are cut up into squares and brought into market, is, as is clearly shown by Mr. Tyson, entirely inapplicable to a country like California, even apart from all considerations connected with its mineral wealth. The necessity of purchasing agricultural land with an eye to the facility of obtaining water and, if possible, wood, indicates sufficiently the necessity of reference to these circumstances in laying out the ground. In the mining region, the general direction of the veins, and the facilities of access and drainage, become points of the greatest importance; and it is evident that, if this portion of the country should be divided and sold without any reference to these conditions, there would be endless trouble and confusion. At present, however, we do not believe the Government has it in its power to make any disposal of the gold-bearing land in California; we doubt even whether any attempt to raise a small duty on the gold obtained on the public territory would not be voted down by the miners. The General Land-Office is now tracing the usual system of base and meridian lines through that region; but we have not heard of any feasible plan being yet originated by which the land is to be disposed of, or rent collected. As a preparatory step to any attempt of this kind, it will be found absolutely necessary to cause a thorough geological survey of the country to be executed, either previous to, or *pari passu* with, the linear surveys. Mr. Tyson insists very strongly on the importance of this undertaking, and to his arguments, based on the practical value to the Government of such a survey, we might add that the scientific results of an examination of this interesting country would be of no common interest.

The question of the probable permanent value of the

California gold-washings, and the influence which the great increase in the production of gold would be likely to have upon the relative value of the precious metals, is one which had already begun to excite great attention, even before the discoveries in Australia, which seem to promise almost another California. No one has treated the geological part of the question with more ability than Sir Roderick Murchison, who, in an elaborate article on the occurrence of gold, published in the Quarterly Review of September, 1850, endeavored to show that, in all probability, the gold-washings of California would soon be exhausted, at the rapid rate at which they were then being worked. He also laid down the proposition, that no gold-bearing veins could be wrought in the solid rock with profit. Hence he inferred it was very unlikely that the present increase in the amount of gold raised would continue sufficiently long to effect any diminution in the value of that metal. Murchison did not fix any period as the limit of the yield of the gold-washings; but the fact that there has been a great increase in the years 1851 and 1852 over 1850, and that there are, as yet, no appearances of a diminution of the quantity, but rather a constant increase, seems hardly to agree with the predictions of this distinguished geologist. We willingly grant that it is not probable that the present enormous amount of gold derived exclusively from washings will continue for a great length of time undiminished. The fact that the large increase in the number of men employed in gold-washing has not caused a corresponding increase in the amount of the metal, shows that the average amount obtained by an individual is not so great as during the years 1849, '50, and '51. But as the facilities for communication increase, and the cost of the necessaries of life diminish, localities may be worked which before would not have been profitable; and by the introduction of more thorough and scientific methods, a very large portion of the matter which has been once subjected to a rude washing may be again worked, and afford a handsome profit. Considering the immense extent of the gold region and its thus far unparalleled richness, we think a long period will elapse before it may fairly be said to be exhausted. How many hundred of millions will be produced, it would require, however, the gift of inspiration to be able to predict.

The question of the possibility of working the gold-bearing veins in the solid rock with profit is one of great importance. A considerable portion of Mr. Tyson's introduction, written some months after the body of the work, is taken up with an endeavor to show, that the hopes of those expecting to mine the auriferous quartz-rock with profit are doomed to disappointment. This has been the case with many of the companies which have undertaken to work the quartz veins, as far as we can judge from the newspaper accounts; and it is not at all surprising. The statements with regard to the richness of the veins in gold being exaggerated beyond all bounds of possibility, it is not to be wondered at that those who put faith in them, and, on the strength of such faith, made their preparations accordingly, were sadly disappointed when they came upon the ground. It might be safely said, in most cases, that if the quartz contained one hundredth part of the amount reported to exist in it, it might be separated in a country where labor and science were in a normal condition with great profit. An enterprise requiring scientific skill, capital, and the use of complicated and costly machinery, could hardly be expected to succeed, at first, in a country situated as California is at present, however rich might be the return under more favorable circumstances. We have no other means of judging of the present condition of the various companies engaged in quartz-mining than newspaper reports, and private letters from intelligent friends in that region. The indications, however, are decidedly in favor of mining being conducted hereafter with profit, and that the gold obtained from the veins will eventually be a large and permanent source of wealth, after the *placer* diggings shall have been exhausted. Murchison insists strongly on the results of our previous experience in the working of auriferous veins, which, as he conceives, demonstrate that the gold is invariably either too much diffused through the rock to be separated with profit, or else that, if rich at the surface, the veins soon lose their metallic wealth, and become valueless, on being worked to any depth. He gives a number of instances in which such have been the facts. We think, however, that he has gone rather farther in his conclusions than the records of mining will warrant, although we would not deny that general experience is unfavorable to the profitable mining of gold from the veins. Still, a large amount of gold has been produced with the rudest machinery and smallest possible amount of skill, from the exploration of auriferous veins in various regions in South America. Nearly all the produce of the Brazilian mines comes from working the solid rock. Enormous amounts were formerly obtained, and for a long period, from the mines of New Grenada, from the same source; and the operations were not suspended from any diminution of the gold, but only on account of the frequent incursions of the buccaneers. The mining operations now prosecuted in the southern United States are by no means as unfavorable as they are represented by Murchison. We believe that mining is prosecuted with considerable success at several points, especially at the Vaucluse mine, Orange county, Virginia, which is said to be the best organized gold mine in the United States. All the accounts agree in representing the number and extent of the quartz veins in California as very great, and that they do contain large amounts of gold is evident from the "specimens" of their contents which the great drift-agencies have so plentifully distributed over the surface of the country;—for no one will deny that all the gold of the drift once formed part and parcel of the very veins now visible, or of others concealed beneath the soil, whose outcrops have been removed in the furrowing and wearing away into deep ravines which took place during the drift epoch, and which are still proceeding on a much-diminished scale, through the action of those never-ceasing laborers, frost and water. Now, unless it can be shown that the diluvial action swept off all the productive portion of the veins, or in other words, that all the metallic wealth which existed was concentrated just at the surface, then we have a right to consider that a goodly store of the precious metal is still remaining within the bowels of the earth, to reward the perseverance and skill of the miner.

The theory of the process by which the metals and their ores have concentrated, or segregated, in the veins in which they are already worked, is one of great interest, but, unfortunately, of almost equal obscurity. With regard to gold, for instance, we know that it is found in certain slaty rocks which belong to very ancient periods in the world's history, and which, since their deposition, have been invaded by other rocks of an igneous character, which have pushed themselves up among the slates, turned them up on their edges, and changed their structure and composition. We have reason to believe that the richest and most abundant gold deposits are almost invariably found in strata of the Silurian age, which belong to the earliest grand epoch after the introduction of organic life upon the earth. We have, moreover, considerable evidence that the metamorphic action of the accompanying igneous rocks was in some way connected with the impregnation of the veins with their metallic wealth. The segregation of the gold seems to have taken place at a very late period in the geological chronology; and it is not improbable that it was connected, at least in some of the richest gold-bearing districts, with the last great epoch, which directly preceded the present condition of things on the earth's surface, namely, that of the drift. Such is the opinion of Humboldt and Murchison with regard to the gold of the Ural, which they consider to have originated at as late an epoch as that of the mammoths, whose huge carcasses lie embedded in the frozen soil of Siberia. From the verbal communications of a distinguished naturalist who has visited California, we learn that there have been disturbances of the rocks of that region during the most recent geological period, though we are not yet aware of any evidence to connect these elevations with the impregnation of the rocks with the gold. This is a point of great interest, which we recommend to the consideration of future geological explorers in California.

There is another interesting question connected with the gold-bearing veins. Granting that they be found sufficiently productive at or near the surface to pay for working, is it probable that this richness will hold as the veins are worked downwards, so as to justify the expenditure of a large amount in preparing the necessary machinery for operating on an extensive scale? In short, can they be wrought with the same confidence with which deposits of other metals are? A true vein is generally considered to be of indefinite depth, and it is always hoped, and frequently found true, that its metallic contents increase in richness as the vein is worked downwards; but it is commonly believed that auriferous veins form an exception to this rule, and that their riches are concentrated near the surface. Some rather fanciful theories have been suggested to account for this supposed fact; but none which can pretend to be at all satisfactory. The occurrence of the enormous *pepites*, or *nuggetts* of gold, as they are called by the Australian miners, in the superficial deposits, while it was taken for granted that none such would be found in the solid rock, as in truth they have not yet been, led to the supposition that there was some mysterious connection between this metal and the atmosphere, by which it was attracted to the surface, or that it rose to the top of the vein by a process like fermentation or efflorescence. We apprehend that it can by no means be considered as proved that all gold-bearing veins must necessarily diminish in richness as they are worked downwards. The increased difficulty of working the rock below the point where it has become disaggregated and decomposed by the agency of the atmosphere, may be, in part, the origin of the general belief in the decreased richness. Gold very frequently occurs in connection with sulphuret of iron, a substance which readily decomposes when exposed to the atmosphere; and in such a state, it leaves the quartz with which it is associated in a more manageable condition, while the undecomposed quartz-rock is one of the toughest and most refractory of substances. It is almost universally the case that gold occurs associated with some ore of iron, either iron pyrites or the specular oxide; we can, however, thus far only state the fact, without the slightest clue to the real reason why these metals occur together, which remains, with many other inquiries of the like kind with regard to the distribution and association of the metals, an excellent subject for future investigations.

The whole amount, as well as the relative proportion, of the precious metals produced throughout the world has undergone an immense change within the last four years. At the commencement of the present century, the whole amount of gold produced throughout the world was 51,000 lbs. Troy; of silver 2,331,000 lbs. Troy; or, by weight, as 1 to 45. At this time, the American continent furnished nine tenths of the gold, and about ninety-one hundredths of the silver, of the world. The political troubles throughout Spanish America, during the years following 1810, caused a considerable diminution in the product of the American mines; but about this time the Russian mines began to be worked, and soon the product of gold from that source began to be of greater importance than that of all the rest of the world put together. The amount obtained from the Russian mines in 1816 was only 194 lbs. Troy; but there was a steady increase up to the year 1848, when the amount had reached 70,000 lbs., the whole produce of the rest of the world at this time being about 40,000 lbs. It does not appear that the Russian mines have yet reached their productive limit; for though the latest statistics indicate a slight falling off in the quantity of gold, yet it is sufficiently accounted for by a large increase of the duty imposed on private mines. In the Russian empire, the Emperor has complete power over the product of the mines, and can check or increase it according to his own ideas of political economy and expediency.

In 1847, just before the discovery of the riches of California, the annual product of gold throughout the world was about 110,000 lbs. Troy. That of silver was almost the same as at the commencement of the century, namely, 2,000,000 lbs., the Mexican mines having nearly regained their former productiveness, and the amount from some of the European countries, as, for instance, that of Spain, being considerably increased. The relative proportion by weight of the gold to the silver was, at that time, as 1 to 18.

The estimates of the quantity of California gold for 1851 vary from seventy to eighty-two millions of dollars. We think the lower estimate nearer to the truth, and even that is too high. The whole amount deposited in the United States mint and branches for the year 1851 was $55,938,502; shipped from San Francisco to London, $3,392,760; shipped to other foreign ports, $600,000; in all $59,931,262. All beyond this sum is mere estimate, and includes the amount added to the circulation of California in the coinage of private assaying companies, and that carried to various other parts of the world in private hands. On the whole, we think that the amount actually produced during 1851 would not probably fall below sixty-five millions, or go above seventy millions of dollars.

The deposits of California gold during the first half of the current year were about $27,000,000, the amount for June being larger than that of any previous month; and it appears probable that the product of 1852 will exceed that of 1851.

The deposits of gold of domestic production at all the United States mints were as follows: 1848, $896,675; 1849, $7,079,144; 1850, $36,938,314; 1851, $56,540,912; first six months of 1852, $27,614,332.

The sum total of gold deposits of domestic origin at all the United States mints, from their establishment up to the end of June, 1852, is $141,877,209; of Californian origin, $125,468,656; leaving $16,408,553 as the product principally of the mines and washings of the Atlantic States.

The astonishing change in the relative amount of the precious metals consequent on the discovery of the Californian *placers* may be seen by examining the following estimates, drawn from the most trustworthy sources, of the yield for the year 1851.

	Gold, lbs. Troy.	Silver, lbs. Troy.
United States,	275,000	30,000
Mexico,	10,000	1,500,000
Central America,	500	
Venezuela,	1,000	
New Grenada,	10,000	15,000
Bolivia,	1,200	120,000
Peru,	3,000	370,000
Chili,	4,000	120,000
Brazil,	13,800	1,000
Russian Empire,	70,000	43,000
Sweden and Norway,		15,000
Carried up,	388,500	2,214,000
Brought up,	388,500	2,214,000
Great Britain,		25,000
France,		5,000
Zollverein,		94,000
Austrian Empire,	3,500	75,000
Spain,		125,000
Sardinia,		3,000
Asia and Africa,*	16,000	20,000
Australia,	18,000	2,000
Total,	426,000	2,563,000

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* Excepting China and Japan, of which we have no accurate knowledge, and whose metallic products are consumed within their own borders.

According to this table, the relative proportion of the two metals had become, in 1851, as 1 to 6. If we estimate the yield of the Australian washings for 1852 at 150,000 lbs. Troy, we shall have a farther increase of gold to about 1 to 4.5 of silver, thus exhibiting the following variations since 1800.

	Relative weight of	
Year.	Gold.	Silver.
1800	1	45
1847	1	18
1851	1	6
1852	1	4.5

It is evident, from these statements, that, while the production of gold has increased suddenly and enormously at various periods since the commencement of this century, that of silver, on the contrary, has been, with slight fluctuations, very slowly increasing, having risen from two millions to something over two and a half millions of pounds Troy, during the last fifty years. It becomes an important question for investigation, whether there is likely to be any considerable change in regard to this metal; since it is evident that, if the present ratio of production continues, there will be a sensible decline in the value of gold compared with that of silver. The history of the precious metals shows that this has been the case heretofore, great fluctuations having resulted from the discovery of new mining regions. It is generally admitted that the relative value of the precious metals had undergone but little change for a long period previous to the discovery of the South American mines. The mines of Potosi began to be worked about the middle of the sixteenth century, and the effect of their enormous product of silver was to cause a great depreciation in the value of this metal. This depreciation, however, was not sudden; on the contrary, silver does not appear to have fallen nearly to its present value till after these mines had been pouring out their treasures for nearly a hundred years. Thus, during the first half of the sixteenth century, gold is believed to have been about ten times the value of silver; at the close of that century it it had risen to be twelve times as valuable, and, fifty years later, it was about fourteen to one. Here it remained nearly stationary for a long period, rising to its present value of about 15¾ to 1, from 14½, during the last half century.

We see how slowly gold rose, even after the South American mines had added so immensely to the amount of silver in circulation; and we may infer, that, if it is to fall, any such change in the other direction will not be a sudden one, but rather the result of the accumulation of many years' surplus. There was, it is true, in 1850, when the great productiveness of the California washings began to be admitted, quite a panic in the silver market, which was increased by the action of the Dutch government in selling a considerable quantity of gold and replacing it with silver, in order to be prepared in time for any depreciation of the former metal. Standard English silver rose, in consequence, from 5 shillings per ounce to nearly *5s. 2d.*; but it has now fallen again to a trifle below 5 shillings. In the mean time, an immense amount of gold is being coined by the French and American governments, and the effects of a largely increased circulation of this metal are felt in France, where it has fallen from nearly two per cent. premium to a slight discount, while in this country, there is a growing scarcity of silver for change, and a considerable premium on it. One great reason why the value of gold has not been, and perhaps will not be, for some time affected to a considerable amount is, that, previous to the discovery of the Californian *placers*, there had been a deficiency of gold which even the produce of the Russian mines had not fully counterbalanced. The immensely increased demand for this metal for consumption in the arts had undoubtedly withdrawn a large amount from circulation, which it was very desirable to have replaced; and for this purpose the supply from California came quite seasonably, except that there seems to be too much of it for the purpose. "It never rains but it pours," says the proverb; and what with the recent development in Australia and the announcement of sundry El Dorados in South America and Africa, we seem likely to be quite overwhelmed with the golden shower.

If there was a prospect of any considerable increase in the production of silver, at all corresponding with that which has taken place with regard to gold, then, though there might be a general rise of prices corresponding to the great increase in the quantity of the precious metals, it is plain that there would not be any great change in their relative value. Although the production of silver may be considerably increased by the discovery and successful working of new mines of quicksilver, still we think it demonstrable that there can never be such extraordinary fluctuations in the amount of this metal raised as there have been in that of gold. We have not the discovery of another continent to look forward to, whose mines, like those of South America, shall deluge the world with metallic wealth. We can only increase the actual amount of silver by the application of skill and capital to the working of veins. Native silver is of comparatively rare occurrence, with the exception of the small percentage which almost invariably occurs united with native gold. Silver occurs in nature principally in a *mineralized state*, that is to say, combined with sulphur or some such substance, from which combination it must be withdrawn by a process requiring skill and capital. Moreover, silver and its ores are obtained almost entirely from veins, many of which become richer in descending, and which must be wrought at great depths, with a great outlay of capital, before a handsome profit rewards the speculation. Gold, on the other hand, as we have seen, is separated from superficial deposits almost without requiring aid from either scientific skill or capital. A few dollars and a day's practice enable the gold-digger, if he be endowed with a sufficient stock of health to endure the fatigue, to set his rocker in motion, or shake his tin pan, so as to separate a large proportion of the golden particles from the sand in which they occur.

Then there is no reason to suppose that the productiveness of the European mines will undergo any very considerable change for the present. These are worked with consummate skill, and any change in their product will be unimportant, unless we except Spain, where there is a possibility of making considerable additions to the product of silver as well as of other metals, provided that this kingdom remains in its present comparatively quiet state. Farther developments in Mexico and South America will depend, partly on the political state of the various governments, and partly on the variations in the price of mercury caused by the discovery of new sources of supply for this metal. Duport, in his valuable work on the production of the precious metals in Mexico, remarks that the principal causes which operate against the almost unlimited development of the metallic wealth of that country are the political troubles, the want of scientific skill, and the high price of mercury. He evidently considers the resources of the country in silver as almost boundless, for he adds, "that the time will come, sooner or later, when the production of silver will have no other limits than such as are developed by the constantly increasing decline in value of this metal." This opinion seems rather exaggerated, when we consider how unsuccessful the English companies have been in their attempts to apply their capital and mining skill in that region.

On the whole, we think there is good reason for believing, if there is an increase in the production of silver, that it will be gradual, and that it will not be in any degree commensurate with that which has taken place recently in regard to gold. The question then arises, what will become of the immense surplus of gold, after all that can be absorbed by the demands of a circulating medium has been supplied? and whether there is reason to believe that gold may be made in any degree to take the place of silver in the arts without a considerable fall in its price, so as to bring it down somewhere near equality with that metal. The physical properties of gold are not so far superior to those of silver as to render it probable that a very considerable change will take place in this respect as long as one is fifteen or sixteen times more costly than the other. In fact, we do not see sufficient reason to suppose that gold, at only five times the value of silver, would drive the latter from general use. Both metals are equally unaffected by the oxygen of the atmosphere, or in other words, equally little liable to rust from common exposure. The melting-point of gold is a little above that of silver, though not sufficiently so to be of any general consequence. Had gold the infusibility of platina it would be an immense addition to its value. Silver is decidedly inferior to gold in two respects, one of which affects its value for common usages; it is dissolved by nitric acid, while gold is only attacked by a mixture of nitric and chlorohydric acids, (*aqua regia*,) and it is easily acted on by sulphur, as is well known by all who have performed the experiment of eating an egg with a silver spoon. This facility of combining with sulphur renders silver liable to be blackened, by the formation of the sulphuret of silver, wherever it is exposed to exhalations of gases from sewers, drains, &c., which contain sulphuretted hydrogen, and when worn in contact with the person. Silver is harder than gold, but the alloy of copper and gold, in the proportion of 1 to 9, is more durable than the alloy of copper and silver used in the arts and in coin. Gold, however, is preëminently distinguished by its color, in which it differs from all other metals; while silver only excels the other white metals in the brilliancy of the polish it is capable of receiving, and in the purity of its color.

It is impossible to form an estimate of the actual amount of the precious metals actually in use in the form of plate, jewelry, and other articles of luxury; but we know that the quantity must be very great, when we consider the amount that has been produced during the last three hundred years, even after making allowance for all that has been lost by wear, hoarding, shipwreck, and every other conceivable cause. Silver is truly an article of universal use; and we do not see, from a comparison of their physical properties, that gold can be expected to take its place in any considerable degree till some approach has been made to equality in their respective prices.

From all that has been said on the subject of the production of the precious metals, we infer: 1. That the present increase in the amount of gold is likely to continue for a considerable period. 2. That there is no probability that the production of silver will increase in a corresponding ratio. 3. That the price of gold must fall very considerably, before it will take the place of silver as a metal of general use in the arts. 4. That the value of gold, compared with that of silver, will decrease, though slowly, and perhaps not to the extent that is generally apprehended.

Before taking leave of Mr. Tyson's work, we ought to refer to his chapter on the climate and agricultural capabilities of California, which subjects are discussed by him with ability. It is evident that a wide field is opened in that region for the application of scientific agriculture; and that well-directed enterprise in that direction will reap a rich reward. No country of equal extent seems capable of supplying a greater variety of crops; and though an artificial system of irrigation would have to be resorted to in many cases, yet the richness of the soil will fully counterbalance this disadvantage. The culture of the vine is especially recommended by the nature of the soil and climate. On the whole, enough has been done in the way of developing the resources of this extraordinary country, to show how much must be done, before we shall have a full idea of its capabilities; and we trust that either the State itself, or the General Government, will see the importance of causing a thorough scientific investigation of the whole region to be made as soon as possible.

ART. II. — *Life of* LORD JEFFREY, *with a Selection from his Correspondence.* By LORD COCKBURN, one of the Judges of the Court of Session in Scotland. Philadelphia: Lippincott, Grambo & Co. 1852. 2 vols. 12mo.

THIS is a very inadequate memoir of one who, both in literature and politics, during the first quarter of the present century, did more than any other man to guide the taste, form the opinions, and direct the conduct of the thinking portion of the English people. At the present day, we can hardly estimate the amount of influence that was wielded by the Edinburgh Review from the time of its establishment up to the period of the Emancipation of the Catholics and the passage of the Reform bill, — two measures which, without its aid, would not have been passed so soon by many years. Newspapers, as means for the formation of public opinion, and not merely for the expression of it and for the dissemination of news, were not then in being. The Edinburgh Review *began* the discussion of great public questions, in a periodical form, and as speaking in the name, not of an